

UNITED STATES MARINE CORPS
Logistics Operations School
Marine Corps Combat Service Support Schools
Training Command
PSC Box 20041
Camp Lejeune, North Carolina 28542-0041

AQM 6305

STUDENT OUTLINE

APPLY AUTOMOTIVE LUBRICANTS

LEARNING OBJECTIVE

1. Terminal Learning Objective: Given a lubrication requirement, LI 2320-12/8, lubrication equipment, lubricants, common shop supplies, and representative vehicle components, perform or describe and demonstrate, as appropriate, the procedures used to apply automotive lubricants, per information contained in the reference. (6.3.7)
2. Enabling Learning Objectives: Given a lubrication requirement, LI 2320-12/8, lubrication equipment, lubricants, common shop supplies, and representative vehicle components, per information contained in the reference, perform or describe and demonstrate, as appropriate, the procedures used to:
 - a. adjust oil level in gear boxes/differentials, (6.3.7a)
 - b. adjust oil level in engine crankcase, (6.3.7b)
 - c. use low pressure grease gun to lubricate steering and suspension system components, (6.3.7c)
 - d. pack wheel bearings, and (6.3.7d)
 - e. fill a low pressure grease gun with lubricant. (6.3.7e)

OUTLINE

1. AUTOMOTIVE LUBRICANTS

- a. Purpose of Lubricants

(1) Grease is used as an automotive lubricant at points on a vehicle where there is metal-to-metal contact. The lubricant helps minimize or eliminate friction and the resulting heat that can damage or destroy moving parts.

(2) Various types of lubricating oils are used in automotive components to prevent metal-to-metal contact between moving parts, carry unwanted heat away from the component, clean the moving parts as they lubricate and help form a seal between the piston rings and cylinder walls of an engine to prevent blow-by of combustion gases. The viscosity of a lubricant determines its application in automotive components. The viscosity of a lubricant is a measure of its resistance to flow. When comparing two oils, the higher viscosity oil will be thicker and flow at a slower rate than the lower viscosity oil.

b. Lubrication Instructions/Orders. During previous training you were told that a lubrication order (LO) or a lubrication instruction (LI) is published for each model of tactical motor vehicle. To refresh your memories, I will briefly review the contents of Card 2 of LI 2320-12/8. This LI is for the M998 Series vehicles.

(1) The column labeled "Lubricants" on the LI provides the abbreviations and noun names of the lubricants used on M898 vehicles and lists the component a particular lubricant is used on.

(2) The column labeled "Capacity" provides the lubricant capacity for the vehicle various components.

(3) The columns labeled "Expected temperature" lists expected temperature ranges and lubricant that is used when operating in the listed temperature range.

(4) The column "Interval" lists, by symbols, the lubrication interval for each vehicle component.

c. Characteristics and Intended Application of Lubricants

(1) Automotive and Artillery Grease or "G" double "A".

(a) GAA is used to lubricate steering and suspension system components, propeller shaft universal and slip joints, towing pintles, winches, wheel bearings and other friction points on vehicles.

(b) GAA is applied according to the LO or LI for the vehicle being lubricated. For an example; Card 3 of LI 2320-12/8 instructs us to

"See Note 10," before applying lubricant to the rear propeller shaft universal and slip joints of a M998 Series vehicle.

(c) The note informs us when to lubricate and also instructs us to lubricate the propeller shaft universal and slip joints using a low pressure lubrication gun. If we used a high-pressure air lubrication gun found in modern maintenance facilities or on the trailer mounted lubrication and servicing unit, we would damage the seals of the universal joints and the slip joints.

1 The hand lever grease gun is used to dispense lubricants in small quantities or for dispensing special type lubricants. Some lubrication points on a vehicle are difficult to reach and require the use of a flexible adapter, like this one.

2 Before applying any lubricant, always clean each fitting of the component being lubricated or dirt will be forced into the bearing point.

3 Check the grease fitting to make sure it has not been painted over preventing lubricant from entering the fitting.

4 Attach the coupler of the grease gun firmly to the lubrication fitting and operate the lever of the grease gun. You will get the best results by taking full strokes with the lever. Operate the lever until the old grease is replaced by new. To prevent an accumulation of dirt, wipe off all excess grease from the lubrication fitting and component that was lubricated.

5 Let's suppose the component to be lubricated would not accept the grease; by the way, this happens frequently. Check the fitting, has it been painted over? Is it damaged?

6 Lubrication fitting too, also a component of the Common No. 1 Tool Set, is used to remove and install grease fittings. If the lubrication fitting tool is not available, use the appropriate size wrench, a box end wrench is preferable.

7 After the fitting has been removed, examine it for damaged threads. If the threads are damaged, replace it with a like item. For an example; if you remove a ninety-degree fitting, replace it with a ninety-degree fitting. Replacement fittings are located in the Common No. 1 Tool Set.

8 If the grease in the fitting has hardened, use a thin-stiff piece of wire, a straightened paper clip works fine, and pick out the

hardened grease, then wash the fitting with cleaning solvent and attach it to the coupler of the grease gun. Operate the grease gun handle and look to see if grease goes through the fitting. If the fitting is serviceable, install it in the component and continue lubricating.

9 If the fitting is known to be serviceable, but the component to be lubricated will not accept lubricant, use the wire to remove any hardened grease in the opening for the fitting. If the component continues to refuse the lubricant, tap the component with a rawhide hammer or hard rubber mallet, this may jar the restriction loose. In extreme cases, the component may have to be disassembled and cleaned or replaced. These actions should be determined by your supervisor.

(c) First, unscrew the head and lever from the cylinder. Then, engage the follower and push it into a full stop. Place the open end of the cylinder approximately two inches into the lubricant and slowly pull on the handle of the follower. Remove the cylinder from the container and check to see if the barrel is completely full. If not, pack the barrel with lubricant tightly by hand to eliminate any air pockets that may have formed in the lubricant. Replace the head and lever assembly and wipe the gun clean. After removing lubricants from their containers, make sure the container lids are installed securely to prevent dirt or water from getting into them and contaminating the lubricants.

(d) After the bearing has been properly cleaned and inspected for serviceability, grasp the bearing with one hand, with the widest part of the bearing facing down. Place a portion of grease in the palm of the other hand and drag the bearing through the grease until the lubricant starts to appear between each of the individual bearings. After each space is filled with grease, lightly apply a coat of lubricant of the outside cage and bearing. This will finish the process of lubricating the bearing by hand.

(e) Bearing packer. To lubricate a bearing with a packer install the bearing on the bottom part of the bearing packer with the widest part of the bearing cage facing up. Screw the cone of the bearing packer down snug, onto the bearing and attach a grease gun to the lubrication fitting on the packer. Operate the lever of the grease gun until you see lubricant starting to come out between each individual roller bearing. Remove the grease gun and bearing from the packer and lightly apply a coat of grease to the outside cage and bearing. Always clean the bearing packer to prevent an accumulation of dirt.

(2) GO 80/90 Lubricating oil.

(a) This lubricant is used in power train components such as manual transmissions, differentials, some transfers and geared hub assemblies in temperatures above 15 degrees Fahrenheit to minus 26 degrees Fahrenheit.

(b) This is one of the highest viscosity oils used in motor transport vehicles.

(c) GO 80/90 is changed only when required by maintenance repair action or if the lubricant has been contaminated by water or other foreign material.

(d) To replace or add GO 80/90 to an automotive component, we use this item, a lubricating oil pump bucket. Make sure the bucket is clean, before and after you use it.

(e) You will find that automotive components that use GO 80/90 for lubrication have different size and types of drain and fill plugs. Check to see what type of tool you need to remove and later install the plug before you begin lubrication services. The reason I mention this is to save you time and effort by not having to stop lubricating to locate the proper tools.

(f) Before removing the fill plug, clean the surrounding area to prevent dirt and foreign material from entering the component and contaminating the lubricant.

(g) The LO or LI for the vehicle specifies to what level gear cases should be filled. However, it's difficult to see if the lubricant is 1/4 of an inch or a 1/2 inch of an inch from the fill plug opening. A rule of thumb you can use to check the level when the lubricant is cold, is to insert and bend your forefinger downward to see if the lubricant level is at the tip of your finger.

(3) OE/HDO 30 engine oil is used in the engine crankcase in temperatures above 15 degrees Fahrenheit.

(4) OE/HDO 15/40 is used in the engine crankcase when expected temperatures are above 5 degrees Fahrenheit. At the present, both OE/HDO 30 and OE/HDO 15/40 are authorized for use when the expected temperatures are above 15 degrees Fahrenheit.

(5) OEA Arctic engine lubricant is used in the engine crankcase, when temperature is expected to be between 40 degrees Fahrenheit to minus 65 degrees Fahrenheit.

(6) Engine oil is poured directly into the crankcase fill, which is located on top of the engine.

(7) Before removing the fill cap, clean the cap and surrounding area to prevent dirt and foreign material from entering the crankcase fill and damaging internal engine components.

(8) Make sure the oil container is clean and the lubricant has not been contaminated.

(9) When changing crankcase oil, check the LO or LI to determine the crankcase capacity and to make sure the lubricant is at the "Full" mark on the dipstick. Do not overfill the crankcase. Overfilling will cause damage to the engine.

(10) Unlike engine crankcase oil, Dexron II does not require periodic changing. If the automatic transmission power steering reservoir or transfer case lubricant level is low, always check the appropriate LO or LI to make sure the proper lubricant is added. Failure to use Dexron II when required will cause damage to the systems.

(11) OE/HDO 10 is used to lubricate automatic transmissions, as a fluid for power steering and hydraulic systems, lubricating oil for internal combustion engines when the expected temperature is well below freezing and as a lubricant for oil-can maintenance. Examples of oil-can maintenance would be a few drops or small spray of oil applied from a dispensing can.

d. Joint Oil Analysis Program

(1) To detect potential component wear prior to major engine and transmission failure and expensive rebuild, the U. S. Army initiated an oil monitoring program.

(2) As an organizational maintenance mechanic, it will be your responsibility to obtain oil samples from engines and transmissions and put them in containers like this one. The locations of the oil sampling points are listed in the lubrication orders.

(3) Your supervisor will label the containers or provide you with the necessary information. The containers will then be sent to the nearest Army oil analysis laboratory to be evaluated for wear metal content. Here, our oil samples are sent to Fort Bragg, North Carolina.

(4) Evaluation of the oil samples by the laboratory will result in recommended oil changes and/or equipment inspections.

(5) When laboratory support is not available, you will comply with the instructions provided in the LO for the vehicle being lubricated.

e. Silicone Brake Fluid

- (1) Silicone brake fluid is identified in our IO's and LI's as BFS.
- (2) The bluish, purple color of BFS is only used for identification purposes and does not indicate that the silicone brake fluid is contaminated.
- (3) On vehicles that have hydraulic brake systems, BFS is poured directly into the reservoir of the brake system's master cylinder. Make sure the cover of the master cylinder and surrounding area are clean to prevent dirt and foreign material from entering the master cylinder.
- (4) Make sure that only silicone brake fluid is used in our hydraulic service brake systems.

f. Grease, Wire-Rope and Exposed Gear

- (1) Grease, wire-rope and exposed gear identified as CW is used on winch cables when operating in damp or salty conditions and/or the winch cable is used infrequently. CW is applied to the cable with a brush or rag.
- (2) CW is also used to lubricate chains and exposed gears that may be subject to rust. This lubricant may be used in all temperature ranges.

g. Safety. Imagine stepping on the fender of a 5-Ton truck and someone had neglected to clean a lubricant spill. It's quite a fall to the shop floor. Believe me, this happens and it can be dangerous to your health.

- (1) If you drop grease or spill oil on a vehicle or the shop floor, clean the area immediately. It takes only a moment or two and could prevent a serious injury from happening; maybe to yourself.
- (2) Shop towels, disposable rags and cleaning solvents used during lubrication should always be put into their designated containers.
- (3) It goes without saying you should always wear eye protection when lubricating the under side of a vehicle and never point a high pressure grease gun at anyone.
- (4) After the lubrication requirement has been completed, return the unused lubricants to the designated area.

REFERENCE:

LI 2320-12/8